

2
PUBLIC HEALTH ACT,

(11 & 12 Vict., Cap. 63.)

R E P O R T

TO THE

GENERAL BOARD OF HEALTH,

ON A

PRELIMINARY INQUIRY

INTO THE SEWERAGE, DRAINAGE, AND SUPPLY OF
WATER, AND THE SANITARY CONDITION
OF THE INHABITANTS

OF THE BOROUGH OF

NEWCASTLE-UNDER-LYME,

IN THE COUNTY OF STAFFORD.

BY WILLIAM LEE, Esq., C.E.,

SUPERINTENDING INSPECTOR.



LONDON:

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FOR HER MAJESTY'S STATIONERY OFFICE.

1850.

NOTIFICATION.

THE General Board of Health hereby give notice, in terms of section 9th of the Public Health Act, that within a period not exceeding one month from the date of the deposit hereof, written statements may be forwarded to the Board with respect to any matter contained in or omitted from the accompanying Report on the Sewerage, Drainage, and Supply of Water, and the Sanitary Condition of the Inhabitants, of the Borough of NEWCASTLE-UNDER-LYME, in the County of Stafford; or with respect to any amendment to be proposed therein.

By order of the Board,

HENRY AUSTIN, *Secretary.*

*Gwydyr House, Whitehall,
March 22, 1850.*

PUBLIC HEALTH ACT (11 & 12 Viet., cap. 63).

Report to the General Board of Health on a Preliminary Inquiry into the Sewerage, Drainage, and Supply of Water, and the Sanitary Condition of the Inhabitants, of the Borough of NEWCASTLE-UNDER-LYME, in the County of Stafford. By WILLIAM LEE, Esq., C.E., Superintending Inspector.

WHEREAS, in pursuance of the Public Health Act, 1848, the General Board of Health appointed for the purposes of that Act have, upon a certain Resolution passed at a public meeting of the inhabitants rated to the relief of the poor of and within the borough of Newcastle-under-Lyme, in the county of Stafford (the last return made up by the Registrar-General of Births, Marriages, and Deaths, showing that the deaths registered in a period of not less than seven years in the said borough have annually on an average exceeded the proportion of twenty-three to a thousand of the population of such borough), directed William Lee, a superintending inspector appointed for the purposes of the said Act, to visit the said borough, and to make public inquiry, and to examine witnesses, as to the sewerage, drainage, and supply of water, the state of the burial-grounds, the number and sanitary condition of the inhabitants, and as to any local Acts of Parliament in force within the said borough for paving, lighting, cleansing, watching, regulating, and supplying with water, or improving the said borough, or having relation to the purposes of the said Act; and also as to the natural drainage-areas, and the existing municipal, parochial, or other local boundaries, and the boundaries which might be most advantageously adopted for the purposes of the said Act:—

Now I, the said William Lee, having previously given the notices directed by the said Act, proceeded upon the said inquiry in the manner directed by the said Act, and do report in writing to the said General Board upon the several matters with respect to which I was so directed to inquire as aforesaid, and upon certain other matters in respect of which I deem it expedient to report for the purposes of the said Act, as follows:—

Gwydyr House, Whitehall, 29th Dec. 1849.

MY LORDS AND GENTLEMEN,

THE inquiry which I was directed by you to make as to the sanitary condition of the borough of Newcastle-under-Lyme was

opened in the Town Hall there on Wednesday, the 3rd day of October last past, and was continued by adjournment on that and the three following days, until I had inspected the whole of the borough, and had heard all persons able and disposed to give information touching the inquiry.

Proof that the notices of the inquiry had been duly affixed, according to the requirements of the Act, was received from Mr. John Smith, the town-crier. According to my instructions, I explained to the inhabitants present the general provisions of the Act, and the mode in which I should conduct the inquiry; after which Samuel Harding, Esq., the Superintendent-Registrar, put in the list of places where epidemic, endemic, and contagious diseases had of late occurred, prepared in accordance with the 9th regulation of the Board.

The following is the list, showing the names of the streets, the number of deaths in each from typhus fever, which raged epidemically in the year 1847, and the number of deaths from cholera and diarrhœa between July of the present year and the period of my inquiry. The list includes nearly every street in the borough occupied by the poor, and scarcely any place in the lower parts of the town have escaped. There were many cases of cholera during my visit, but daily house-to-house visitation had been adopted, and the disease was rapidly declining. The list therefore does not include all the deaths from cholera and diarrhœa during the year :—

Names of Streets.	Deaths from Fever during 1847.	Deaths from Cholera and Diarrhœa, 1849.
Red Lion-square . . .	1	4
High-street . . .	3	7
Penkhull-street . . .	4	10
Goose-street . . .	2	2
Lower-street . . .	13	28
Church-street . . .	..	9
Globe-yard . . .	..	2
Pepper-street . . .	2	4
Ford's-yard . . .	..	2
Post-office-yard . . .	..	1
Friars-street . . .	1	9
Roebuck-lane . . .	..	5
Hick-street . . .	..	2
Paradise-street . . .	1	1
Higher Land . . .	1	13
Deansgate . . .	1	6
Carried forward	29	105

Names of Streets.	Deaths from Fever during 1847.	Deaths from Cholera and Diarrhœa, 1849.
Brought forward	29	105
Cross-street . . .	..	5
Union-street . . .	..	6
Drayton-street . . .	..	2
Pool . . .		
Holborn . . .	3	6
Sunday-wells . . .		
Lower-green . . .	4	14
Dunkirk-green . . .	2	4
Fletcher-street . . .	6	12
Upper-green . . .	1	6
Cotton-street . . .	..	2
Liverpool-street . . .	..	5
Bridge-street . . .	..	8
Salter's-lane . . .	3	5
Bath-street . . .	..	5
Merrial-street . . .	..	7
Shoreditch . . .	..	3
Rye-croft, Rye-bank . . .	2	2
Ironmarket . . .	1	1
Market-street . . .	..	2
Stubbs-street and Stubbs-gate . . .	2	2
London-road . . .	2	2
Garden-street . . .	4	3
Hassells-street . . .	11	12
Bow-street, Ball's-yard . . .	1	5
Bagnall-street . . .	..	4
Windsor-street . . .	..	2
Seott-street . . .	1	..
George-street . . .	3	2
Princess-street . . .	..	1
Cumberland-street . . .	..	1
Union Workhouse, patients re- moved from Lower-street, Fletcher-street, and Green . . .	23	..
	98	234

Under the head " Diseases and Mortality " I shall refer to these figures in a subsequent part of this Report. It will be sufficient here to observe that the two epidemics were most fatal in the same localities, and to request the attention of the Board to the details which will be given as to the physical condition of the inhabitants of those places.

After the necessary preliminary business I proceeded to inspect the whole of the borough, and was accompanied, and otherwise assisted, by John Hallam, Esq., mayor; Edward Wilson, Esq., M.D.; George John Wood, Esq., M.D.; Augustus Frederick Gooday, Esq., M.D.; William Hallam, Esq., certifying surgeon for factories; Richard L. Dudley, Esq., medical officer of the union; James Spark, Esq., surgeon; Samuel Mayer Turner, Esq., surgeon; Alderman Mayer; Thomas Walton Mayer, Esq., chairman of the sanitary committee of the town council; Samuel Harding, Esq., superintendent registrar; Liddle Elliot, Esq., engineer to the Staffordshire Potteries Waterworks Company; Francis Stanier, Esq., coroner; John Smith Mayer, Esq.; Mr. William Hargreaves; and Mr. Isaac Cotterill, surveyor of works and superintendent of police.

NEWCASTLE-UNDER-LYME is a parish, borough, and market-town in the north division of the hundred of Pirehill, in the county of Stafford. It is the centre of a poor-law union, comprising nine parishes and a population of about 20,000. The area of the borough is only 640 acres. The first charter appears to have been granted to Newcastle by King Henry II. The first charter of incorporation, 32 Eliz., was confirmed and enlarged by 16 Car. II., which remained the governing charter till 1835, when the Municipal Reform Act came into operation. The borough is now governed by a mayor, 6 aldermen, and 18 councillors. The borough has returned two members to Parliament ever since the 27 Edward III., if not for a longer period. Under the New Boundary Act, a small isolated portion of the parish of Stoke was added to the borough.

The Queen, as lady of the manor of Newcastle-under-Lyme, in right of the duchy of Lancaster, is owner of all the mines of coal and ironstone under the copyhold lands of the manor, but there are no copyhold lands within the limits of the borough.

The chief manufacture of the town is that of hats, which are prepared for the finishers in London. Newcastle was formerly regarded as in some measure the capital of the pottery district, and it was much frequented by travellers and coaches till the opening of the Grand Junction Railway.

The hat trade has been for some years in a depressed condition, and the wages have been very low in consequence. A considerable quantity of shoes are also made in the town, and many of the people go into the potteries to work. Female children are employed in two silk-mills. Unless it be in the manufacture of hats, there is no trade operation prejudicial to health.

Drunkenness is said to be very prevalent among the poor, and narcotics are extensively administered to infants.

The principal street of the town is spacious, and many of the houses well built. The market-place is in the centre, and forms a fine open space, in which stands the guild, or town-hall, raised

on columns and arches, so as to form a covered market underneath. There are two churches in the town, and chapels belonging to nearly all denominations of dissenters.

There is a published plan of the borough on a scale of 4 chains to an inch, showing all the buildings, privies, &c. The survey was made in 1847 by Mr. Robert Malabar, a surveyor residing in the town, who states that he could plot the whole of the work on a larger scale with great facility. Judging from the published plan, and the care taken about the divisions of the buildings, it appears to have been very carefully made and drawn. I am unable to say whether the accuracy of the work has been insured by fixing the points trigonometrically, but this would be indispensable. The present scale would, however, be very much too small for sanitary works. Mr. Elliot has a block plan on a larger scale, made for the purposes of the New Waterworks Company.

Local Acts of Parliament.—There are not less than seven local Acts of Parliament in force within the borough. Some of these have an important bearing upon the works to be executed under the Public Health Act, and I quote the titles of the others, because they may come within the terms “regulating or improving” the borough:—

22 Geo. III., c. 29, is “An Act for Inclosing and Leasing a Piece of Waste Land called the Marsh, within the Parish and Borough of Newcastle-under-Lyme, in the County of Stafford, and applying the Profits thereof in aid of the Poor’s-rates of the said Parish and Borough.”

23 Geo. III., c. 10, an Act to amend the above.

56 Geo. III., c. 33, “An Act for Inclosing Lands in the Parishes of Newcastle-under-Lyme, Trentham, Woolstanton, and Stoke-upon-Trent, in the County of Stafford.”

This Act directs that land shall be allotted to trustees, partly for the purpose of public pastures for the freemen (who are a body of 800 or more), and partly as town-walks for the inhabitants of Newcastle-under-Lyme, and it vests all such allotments in the said trustees in satisfaction of the freemen’s rights of common. Those trustees are the freemen possessing a landed qualification of 40*l.* per annum, or being heirs apparent of freemen with like property of 100*l.* per annum; and therefore members of the town-council not so qualified are not at present trustees for any of the purposes of this Act.

Under this Act the walks were constructed, and are highly ornamental to the town, but they are not kept in very good order, and I am of opinion that it would be better that, under the Public Health Act, the mayor, aldermen, and council should be constituted sole trustees of the town-walks established for the inhabitants under the said Inclosure Act.

59 Geo. III., c. 71, is "An Act for Paving, Lighting, Watching, Cleansing, Regulating, and Improving the Borough of Newcastle-under-Lyme."

The then corporate officers were appointed commissioners for executing the Act, and since the Municipal Reform Act the mayor, aldermen, and council have continued to execute the duties of commissioners. The Act contains many very good provisions for setting back and regulating new buildings, paving and draining the public highways, lighting, watching, and cleansing, and the removal of nuisances and obstructions, naming streets, numbering of houses, preventing damage to the town walks, regulating the markets, &c. &c. Among other excellent provisions is one prohibiting the covering of any building with thatch or straw, or the repair of any covering of a building so covered at the time of the passing of the Act. I think, therefore, that such of the provisions of the Act as are consistent with the Public Health Act should be continued in force, and that any uncertainty as to the exclusive jurisdiction of the town council to act as commissioners should be amended in the provisional order.

59 Geo. III., c. 107, is "An Act to establish a Company for Lighting the Borough of Newcastle-under-Lyme with Gas."

11 and 12 Vict., c. 204, is "An Act for supplying with Water certain parts of the Staffordshire Potteries, and the Town of Newcastle-under-Lyme, and several Townships and Places adjoining or near thereto."

12 and 13 Vict., c. 36, is "An Act to extend and enlarge the Powers of the Staffordshire Potteries Waterworks Act, 1847."

One of the clauses enacts, "That nothing herein contained shall be deemed or construed to exempt the Company from the provisions of the 'Public Health Act, 1848,' or any general Act relating thereto, or to the subject-matter thereof, which may pass during the present or any future Session of Parliament."

There are no other local Acts of Parliament in force in the borough of Newcastle-under-Lyme, for paving, lighting, cleansing, watching, regulating, supplying with water, or improving the same, or having relation to the purposes of the Public Health Act.

CONTOUR GEOLOGY, METEOROLOGY, &c.—Newcastle is situated at the foot of a range of hills which take their rise in its vicinity, and run northward through the centre of the kingdom. The Holborn Brook on the west, and the Newcastle-under-Lyme Brook on the south-west, flow through the town. From these two the ground rises rapidly, so that the general aspect is to the south-west. The Upper Green, Fletcher-street, &c., are situated on the west of the Holborn Brook, and the suburb called the Higher Land is on the south of the Newcastle-under-Lyme Brook; but with the exception of the Pool Dam, and a narrow tract at the bottom of the valley, a town could scarcely have a more favourable



SCALE.



site, or a physical contour better adapted for the discharge of its surface-water.

The surface-soil of any district is always dependent on the subsoil and geological strata. In Newcastle its general character is rather heavy, being derived from subjacent clay, and it is therefore retentive of moisture. Such lands have a tendency to bake during summer, and to be difficult to work during a wet season. Having once become saturated, they shoot off the rain-fall rapidly; and wherever an extensive district of such land exists, the lower grounds are subject to inundation. There is no effectual remedy but thorough-drainage. The same remark is equally applicable to the site of the town as to the agricultural land. The general condition of the subsoil is such as to produce dampness in cellars and the foundations of buildings, and to charge the atmosphere with an undue proportion of watery vapour, which, in the midst of a dense population, is accompanied by the deleterious gases arising from unremoved organic matter, and becomes the cause of disease.

The geological character of the borough is the new red sandstone. On the higher parts to the east, however, is a strong bed of clay, and another of marl, which extend into the coal-measures of the Potteries. The clays are and may be used for bricks, tiles, pipes, and other matters necessary for the construction of sanitary works. The property which these clays have of retaining their forms well in the burning renders them peculiarly well adapted for hollow bricks, by the use of which the cost of erecting cottages for the poor may be easily reduced one-third, or, what is better for the poor man, his house may be made almost twice as convenient and comfortable for the same rental. The clays probably average 24 feet thickness, and the marl below about the same. The geological stratum underneath will be the lower new red sandstone, the thickness of which I could not ascertain, as it had not been pierced. There is great confusion arising from faults, and to them are attributable the numerous springs of water. In some places the stratum becomes mere red sand, and in others calcareous earth. The contour and substrata of the borough are highly favourable for the construction of efficient and economical works.

No register of the rain-fall, or other meteorological observations, have been kept. The prevalent wind is westerly; but during the cholera it is said to have been mostly from the north-east.

POPULATION AND RATE OF INCREASE, NUMBER AND CLASSIFICATION OF HOUSES.—The number of inhabitants at the census of 1831 was 8192; at the census of 1841 it was 9838; and at the end of 1848, according to calculations which Mr. Harding, the Superintendent-Registrar, has made for this Report, 10,432. The rate of increase from 1831 to 1841 was 20 per cent.; but from 1841 to 1848 it was only 6·01 per cent.

The number of houses in 1831 was 1578; in 1841 it had increased to 1924; and at the period of my inquiry the number was 1999.

From 1831 to 1841 the rate of increase in the houses was 21·9 per cent.; but from 1841 to October 1849 it was only 3·9 per cent.

The number of inhabitants per house in 1831 was 5·19; in 1841 it was 5·11; and at the end of 1848 was 5·22. The last deduction will not be strictly accurate, because I have used the population of 1848 for the houses in 1849; but the error will be exceedingly slight, as very few houses have been erected during the year.

Mr. Harding has also furnished me with the following classification of the houses in the borough, from which the Board will see evidences of an ancient town, which has risen slowly to its present size. The smaller proportion of the cottages to the larger houses contrasts strongly with similar returns from Burslem and the other neighbouring towns, where the rapid development of a particular branch of commerce has called into existence, in a few years, large populations, consisting chiefly of artizans, and along with them a relative proportion of inferior dwellings.

TABLE of the Annual Rateable Value of Houses in Newcastle-under-Lyme.

				Number of Houses.	
3 <i>l.</i> and under 4 <i>l.</i>	.	.	.	666	
4 <i>l.</i> „ „ 5 <i>l.</i>	.	.	.	428	
5 <i>l.</i> „ „ 6 <i>l.</i>	.	.	.	169	
6 <i>l.</i> „ „ 7 <i>l.</i>	.	.	.	134	
7 <i>l.</i> „ „ 8 <i>l.</i>	.	.	.	56	
8 <i>l.</i> „ „ 9 <i>l.</i>	.	.	.	31	
9 <i>l.</i> „ „ 10 <i>l.</i>	.	.	.	38	
10 <i>l.</i> „ „ 15 <i>l.</i>	.	.	.	155	
15 <i>l.</i> „ „ 20 <i>l.</i>	.	.	.	91	
20 <i>l.</i> „ „ 25 <i>l.</i>	.	.	.	62	
25 <i>l.</i> „ „ 30 <i>l.</i>	.	.	.	40	
30 <i>l.</i> „ „ 40 <i>l.</i>	.	.	.	54	
40 <i>l.</i> „ „ 50 <i>l.</i>	.	.	.	25	
50 <i>l.</i> „ „ 60 <i>l.</i>	.	.	.	18	
60 <i>l.</i> „ „ 70 <i>l.</i>	.	.	.	13	
70 <i>l.</i> „ „ 80 <i>l.</i>	.	.	.	3	
80 <i>l.</i> „ „ 90 <i>l.</i>	.	.	.	2	
90 <i>l.</i> „ „ 100 <i>l.</i>	.	.	.	1	
100 <i>l.</i> and upwards	.	.	.	13	
Total				.	1999

DISEASES AND MORTALITY.—The awful condition of the borough at the time of my visit, from the ravages of cholera, was such that any sanitary defect existing in the neighbourhood of any house

was almost certain to be fatal to some of the inmates. If I were, therefore, to lay before the Board, under *this* head of the Report, such portions of the minutes made during my inspection as clearly and immediately connect accumulations of decomposing animal and vegetable matter, bad water, and foul air with disease and death, I should exhaust the observations which I usually place under the heads of "Water Supply," "Drainage," and "Ventilation." I am constrained, therefore, to depart from my usual course of proceeding, and to notice the direful effects when I come to point out their efficient causes under the several heads just enumerated.

I have endeavoured as much as possible to condense the evidence given on this part of the inquiry, but it will still be more extensive than usual—a circumstance attributable to the anxious feeling of alarm in the minds of the inhabitants generally, and to the conviction on the part of the medical men of the absolute necessity of remedial measures being applied without delay.

Edward Wilson, Esq., M.D., Senior Physician to the North Staffordshire Infirmary, said,—

"I have been resident in Newcastle-under-Lyme 15 years, and am well acquainted with the sanitary condition of the place. The most prevalent diseases of the town are fevers of typhoid character, scarlet fever, measles, upon more than one occasion small-pox, diseases of the respiratory organs, and recently cholera. Typhoid fevers and scarlet fever have been epidemic here. Scarlet fever is now epidemic, more or less. Epidemic influenza has visited us twice, namely, in 1834 and 1847. There is a low form of typhoid fever always prevalent in some parts of the borough. It is occasionally protracted for some weeks, is obstinate, and tends much to undermine the constitution. Such diseases render persons afterwards more susceptible of active disease. Where fever is endemic, persons attacked with active disease are much more likely to sink under it than persons in a more healthy district. That the labouring population are in a depressed physical condition is proved by the rate of mortality. I do not think the population has increased so since 1841 as during the 10 years previously. I estimate the number now at 10,306. That is taken from the actual numbers of births and deaths, without any calculation for the fluctuating population. The average deaths for seven years is 288·25, and the population I have named would give a mortality equal to 1 in 35·75, or 28 and a fraction to a thousand of the inhabitants. That is a very large mortality indeed.

"As seats of excessive mortality, I should name the *Upper and Lower Greens, Fletcher-street, Holborn, Lower-street, Pool Dam, Goose-street*, and the *alleys* opening into those streets, and, indeed, the whole of the lower parts of the town, and the *Higher Land*. If the mortality of those were separated from the better parts of the town, it would be very high indeed, probably amounting to 4 per cent. The habits of the people residing in those parts are not so good as they might be. Many of the inhabitants reside there. I should think the Irish population amounts to not less than 800. They suffered severely

from typhus fever in 1847, but not to the same extent from cholera this year. In many of the streets there is no drainage, and the public arrangements are not such as to secure the health of the inhabitants. In many places which I have visited during the prevalence of cholera I have found accumulations of filth, overflowing privies, and general want of drainage, sufficient to engender disease, irrespective of the habits of the occupants. In those parts of the town where fever prevails the defects are—want of sewerage and drainage, great and neglected accumulations of refuse, dirty habits, and an overcrowded state of lodging-houses, where men, women, and children are huddled together indiscriminately on straw, or five or six in beds packed together in one room. Where fever raged in 1847, so has cholera in 1849. I draw from this and other facts that the development of fever and cholera has been promoted by the same exciting causes, and certainly they are to a great extent within the meaning of the term PREVENTIBLE. Of the first 120 persons who died from cholera, there was certainly not more than one in absolute want. Besides the local or private nuisances, there are several general or great nuisances. I should describe Newcastle as almost surrounded by water semi-stagnant. The Upper Canal is a great nuisance, injurious to health. The Rector's Pool and meadow are highly objectionable. The Holborn Brook is the next great nuisance, which runs into a greater nuisance, namely, the Pool Dam. The Lower Canal is the greatest nuisance of all, inasmuch as all the sewers of the town flow into it, and every boat going along stirs up the foul mud from the bottom. The irrigated meadows, being so near the town, are also injurious to health. Means ought to be taken to remedy these crying evils, and to show the inhabitants what can be done by drainage. I would name what has been done in Stone, where fever was formerly frequent; but about the former visitation of cholera in 1832 the town was properly drained, and since that time fever has not been epidemic, nor have they had the cholera during the present year. There is also a village called Hilderstone, where there was much fever until a pond was filled up, and then the fever ceased. If we can have the town put into a proper sanitary state, without a Board of Health, I think it will be better: I do not, however, know that the Council of the borough could execute the necessary works. If the Council have not the power, let us have as many Boards as may be necessary. I am aware that the Public Health Act provides means for improving the health of the town, and that, if properly carried out, it would materially reduce the mortality of the borough."

Richard L. Dudley, Esq., Medical Officer for the Newcastle district of the union, says in his evidence—

"I have been deputy-surgeon and surgeon to the union for the last twelve or thirteen years, but have practised here seventeen years, and was hospital-surgeon during the prevalence of cholera in 1832. I am well acquainted with the sanitary condition of the borough. My official duties have brought me into daily contact with the poorer classes. With respect to the native inhabitants of the town, they are generally as cleanly as they can be under the circumstances; but there is a great number of Irish, and I am sorry to say that their habits are very filthy, and that has tended to produce and disseminate disease when any epi-

demie has existed in the town. The privies are emptied with great irregularity, and are much neglected. This is one of the greatest evils connected with the dwellings. The surface of the court-yards is generally unpaved, and saturated with the refuse from houses and privies. I should consider that, as exposing a large evaporating surface, very injurious to health. I know the rate of mortality in Newcastle, and am of opinion that it might be materially reduced by proper sanitary works and arrangements. The physical condition of the poorer inhabitants was certainly better in 1832 than it is now. They were better off for work, and the cholera was not so malignant. To a very great extent the cottages and appurtenances were cleaner and in a better sanitary condition than they are now. I should say that the general sanitary state of the town immediately before the recent outbreak of cholera was about the same as in 1832; certainly not better. The next epidemic was influenza in 1834. I think that any circumstances tending to increase the quantity of watery vapour in the atmosphere, and to contaminate the air, would depress the nervous energy, and so render persons more susceptible of a disease like influenza. The next following epidemic was scarlatina and small-pox, which were both epidemic and contagious. They would be both of them much aggravated by defective sanitary arrangements. Typhus fever was epidemic in the latter end of 1846; and from January, 1847, to January, 1848, I saw more fever than I have seen besides during the seventeen years I have been in practice here. As to its character, I have two pupils who were both laid up twice during each year for fourteen days at a time from the infection. In 1847 we had influenza also, but it was better understood and sooner cured than in 1834. That brings us down to the present visitation of cholera. It commenced nine weeks ago, has attacked many persons and been very fatal. I consider that to these diseases, which might to a great extent have been prevented by proper sanitary regulations, the high general rate of mortality is to a very large extent attributable. Whenever any epidemic disease makes its appearance in the borough, I expect to find it in such places as *Penkhull-street*, *Fletcher-street*, *Friars-lane*, *Holborn*, *Lower-street*, *Upper and Lower Green*, the *Higher Land*, and *Ball's-yard* in the *Ironmarket*. The Upper and Lower Canals are frequently stagnant. Portions of them receive drainage from the town, and they are, no doubt, to some extent prejudicial to the health of the inhabitants."

Augustus Frederick Gooday, Esq., M.D., says—

"I am a member of the London College of Physicians, and have been in practice here only a short time; but during that time I have seen above 100 cases of cholera in the town and neighbourhood, besides a much greater number of cases of diarrhoea. I found the disease most virulent in the most densely populated parts of the town. I have had experience of cholera in India, where I was in the medical employ of the Hon. East India Company at Calcutta. I there attended the cholera hospital. It is slower in its course and milder in its form here than in India. I attribute that to the difference in climate and mode of living principally. There, as here, however, its track is among filth, and chiefly on the banks of rivers, and in low-lying and poor districts that are in a bad sanitary condition. I think from what I have seen

that there are many nuisances in this town which have aggravated cholera, and which, if they had been removed, and the town properly drained, would have prevented it from being so malignant. The *Upper* and *Lower Canals*, the *Pool Dam*, and the pasture near the Rectory, are more especially, in my opinion, very prejudicial to the health of the inhabitants. *Windsor-street*, *Bagnall-street*, and *Bow-street*, are unhealthy localities. *Bow-street* is in the immediate neighbourhood of the Rectory Meadow, and in *Windsor-street* and *Bagnall-street* the houses are much crowded together. I am decidedly of opinion that the practice of interments in towns ought to be discontinued. I do not think the Town Council can do what is necessary without the Public Health Act, as they have not funds sufficient."

Samuel Mayer Turner, Esq., surgeon, says—

"Since the outbreak of cholera additional medical officers have been appointed, and I have had a district assigned to me, including *Lower-street*, *Holborn*, *Frog Hall*, *Bridge-street*, *Liverpool-street* and road, *Upper* and *Lower Green*, *Fletcher-street*, and *Pool Dam*. Cholera has been prevalent in all these places. Between the 6th day of August and the 30th of September I attended in that district 618 cases of diarrhoea, and 110 cases of cholera, 54 of which were fatal. I believe that the mortality has been greater in my district than in any other, and that the disease has assumed a more severe type in the *Lower Green* than in any other part of my district. I am of opinion that the Public Health Act will be of great advantage to the borough with reference to the drainage and cleanliness of the town, and the regulation of the lodging-houses."

William Hallam, Esq., surgeon, says—

"I have been practising here twelve years. Whenever there has been fever or other epidemic in the town I have generally found it in the same localities. I would name the courts in *Fletcher-street*, more particularly during the famine-fever, and *Holborn*. I imagine that several parties came into the town infected with that fever. Cholera has been very malignant by the *Pool Dam* side, in *Blue Ball-yard*, and in *Lower-street*. I think that much might be done by the carrying out of the Public Health Act to remedy the condition of these districts, and that with an efficient system of sewerage and drainage, and a proper supply of water, we should not have the excessive mortality we now have in the town. I consider the crowded state of the lodging-houses the cause of much fever and also of cholera.

"The first case of cholera occurred in the latter end of July in the *Blue-Ball-yard*, just under the parish burial-ground. It was that of a young female who passed unto the secondary fever and recovered. The mother took the disease in about a week and died. The master of the house immediately removed on my recommendation, because I did not consider the house fit for human beings to live in. The name of the 'Miniature Black Hole of Calcutta' has since been given to it. I knocked the panes out of the window to admit air; it would not open, and the stench was very bad. Up a flight of steps and within a few yards there was a large open cesspool containing liquid nightsoil. In a court on the opposite side of the yard I saw an empty house, the floor covered with ordure, and in a most filthy condition. The cholera

seemed to spread from this particular locality along *Lower-street* and on the sloping streets leading out of the valley, beginning with *Church-street*, *Pepper-street*, *Roebuck-lane*, *Ford's-yard*, where there were two deaths in one house close to a slaughter-house and an open cesspool, *Post-office-lane*, *Friars-lane*, and *Lowe's Bank*. In *Lower Bath-street* there is a sleeping-room without any window at all, and the occupier of the house has broken a hole through the wall to admit air. The family has been continually ill. *Lower-street* is now called the "Valley of Death," more than 40 deaths having occurred in it, and the streets leading out of it, from cholera. I believe that the borough might be made as healthy as any other town, and that the Public Health Act would enable the Council to do what is necessary. I am a member of the town council, and think that the provisions of the local Improvement Act are enforced as far as they can be without great immediate expense."

James Spark, Esq., surgeon, says—

"I have been in practice in Newcastle twenty-eight years. I consider the geographical position of the town good; the air is naturally pure, but there is too much moisture in it: there is a great quantity of good water if it were properly applied. Those are conditions essential to good health, and would have been sufficient to preserve good health if they had not been marred and abused. The evils producing the high rates of mortality in the Registrar-General's Returns I would divide into two classes, the public and private.

"1st. The public evils. I think I am justified in saying that the moisture is considerably increased by the water with which the town is almost surrounded: I mean the water in the Pool Dam and the Upper and Lower Canals. The map will show that there is a belt of water surrounding the town, and I think the different levels of it a disadvantage: there are also two or three ponds in the town. The Pool Dam is not merely injurious to health from the water in it, but, as the miller keeps the water up, the feeders are also kept at a high level, and the result is, that the meadows themselves are constantly saturated and brought into the condition of marsh-land. The evaporating surface must add considerably to the prevailing moisture. When the water is drawn off for the purposes of the mill, large stinking mud-banks are exposed; that usually takes place in the summer, and I very often perceive the smell most abominable from it. On the side next the town there would be the refuse from the sewers and drains in addition to the decaying vegetable matter brought down the streams. I think the emanations from these mud-banks sufficient to be injurious to all parts of the town. There is some garden-ground adjacent to the Pool Dam near the Higher Land in a very bad state. All the privy and surface refuse is washed down there. I should certainly say that the general want of a system of deep under-drainage of the town is a great evil. The outlets of such drains as exist are very bad; some of them open into cesspools, and others break out to the surface near the dwellings. The public drainage of the marsh is very defective, and the condition of the neighbourhood of the Ironmarket and the Glebe Meadow injurious to health. The meadow is little better than a morass; I live opposite to it, and have had fatal cholera in my house;

it was also in the next door but one, and choleraic diarrhœa has prevailed in many of the better class of houses near me. My neighbours have their cellars frequently under water, and I have paid 50*l.* for a drain from my own cellar, but it has now a foot of water in it, owing to the main drain into which it opens being choked up with mud. This part of the town ought to be very healthy, but the poor people in the neighbourhood have suffered much from cholera and fever, which I attribute mainly to the above causes. Out of all the small streets in the neighbourhood of the glebe-land, two-thirds of the houses have had cholera in them in some form. In one house there have been three deaths: I have attended myself upwards of 400 cases.

“2nd. With reference to the private defects. I consider that much injury results from the bad sites of the houses; many of them have no back doors; many of them have windows that cannot be opened. The privies are either against the houses or closely contiguous: I find that some few houses have no privies whatever; the bad privies are frequently above the levels of the houses, and the fluid soaks through the walls: they are kept in a filthy condition. Very few yards are entirely paved. The keeping of swine is a very common practice. Many of the living and sleeping rooms are incommodious as to area and breathing space, and the bed-rooms very much crowded. The occupants of many of the houses are filthy in their habits. All these circumstances taken together are in my opinion calculated to account for the excessive mortality of the place. The average number of deaths for seven years is 288, but in 1847 it was 457. In round numbers 100 of those were from typhus fever, and the remaining portion of the excess was from scarlatina and measles; the two latter were undoubtedly aggravated by the bad sanitary condition of the town. The result of this is, that the vital energy of the people is depressed, and they are predisposed to any epidemic disease, whether originating within the borough or coming from other places. I am of opinion therefore that the Public Health Act would be of great advantage to Newcastle, as it proposes to deal with all the evils which I have enumerated in my evidence.”

I received from Mr. W. Hallam, in addition to his medical evidence, some valuable statements as to the Friendly and Sick Societies in the borough. It appears that they are not generally in a satisfactory state, and that two or three of the most important ones have broken up within a year or two, after having been in existence at least 30 years. Founded upon wrong principles, they appeared to prosper for a while, but when the members began to decline in years the permanent superannuated pay was too great for the funds to support; and many, who had contributed during the years of strength, in the hope of something to fall back upon when no longer able to labour, have found all their hopes perish, and the parish their only resource. Similar societies in the neighbourhood have broken up from the same causes, and Mr. Hallam is of opinion that there are others in the borough that may come to the same end. The Odd Fellows have been obliged to raise their contributions 2*d.* each member per month, and are not on

such a stable footing as they ought to be. Not many of these societies are enrolled under the Friendly Societies Act, and most of them are held at public-houses; but the reason of their failure is, undoubtedly, the fact that the sanitary condition of the town or place in which they are established has not once been considered. Rates of mortality, and vital statistics applicable to the locality, have not been thought of by the members. They have never contemplated the fact that an abundant supply of water in the town would enable them to give probably one-fourth more sick-pay and funeral-money to the members; and that, with an efficient system of public and private drainage of the town in which they reside, their sick societies, now languishing and dissolving, might have flourished and prospered with contributions equal probably to only two-thirds of the present rates.

Thomas Walton Mayer, Esq., says—

“I am a member of the town council and chairman of the sanitary committee. The duties of the committee have been for some time past very onerous. I have several times examined the whole town within the last month, and have found the filth districts to be also the cholera districts: many of them are identical also with the localities of fever. My duties have produced a conviction that unremoved decomposing organic matter and disease have to each other the relation of cause and effect. I have found that many of the most malignant cases of cholera were in the localities where the greatest quantities of stagnant refuse existed, especially where it was in crowded and ill-ventilated courts. This conviction has impelled me to take an active part in promoting the application of the Public Health Act to the borough.”

I have already given, with the list of streets where epidemic, endemic, and contagious diseases had occurred, the number of deaths in each from typhus in 1847, and from cholera and diarrhœa during the present year up to the time of my inquiry. I now proceed as briefly as possible to some other facts of vital importance to the borough.

The following is a copy of a return as to the mortality in the borough of Newcastle-under-Lyme, showing the proportion of deaths to one thousand of the population on an average of seven years—from 1838 to 1844 inclusive:—

	Population in 1841.	Deaths in 7 Years, from 1838 to 1844.	Annual Mortality to 1000 persons living.
Borough of Newcastle-under-Lyme	9838	1986	28

General Register Office, 24th November, 1849.

(Signed) GEORGE GRAHAM, *Registrar-General.*

The mortality from typhus fever only, additional to this extremely high average, was, in 1847, equal to 9·4 to 1000 of the then population; and the actual mortality from cholera and diarrhœa in the 9 weeks preceding my inquiry was nearly 22½ per 1000 of the population. Even this does not give an adequate idea of the awful mortality in the unhealthy parts of the borough; and at my request John Smith Mayer, Esq., who had been most active during the whole of the pestilence, divided the town by a line running north-westwardly into two nearly equal portions, and ascertained that the mortality in the lower and more unhealthy part had been double that in the upper.

I might show, from the data furnished by the Superintendent-Registrar, the great loss of life and labour in Newcastle when compared with other more healthy districts, and extract the money-value of the preventible sickness and mortality of the borough; but it would still further extend this part of my Report, and, after what has been already stated, will, I think, be unnecessary. Enough has been said to convince the inhabitants that the preservation of life and health is a great economy, and that the borough of Newcastle affords large scope for the reformation and improvement of its sanitary condition.

LAND DRAINAGE.—The area of the borough does not exceed 640 acres, and therefore the improvement in the condition of the atmosphere by agricultural land-drainage would be limited. It has already appeared, from the medical evidence, that there is superabundant vapour, and that it is injurious to health. Much of this arises from the Pool Dam; but it appears, from the testimony of Mr. Isaac Cotterill, the surveyor of works, that the land is still capable of great improvement in this respect. He says—

“A great deal of land-drainage has been done within the last four or five years with half-round tiles and soles. They are laid about 2 feet deep, and from 24 to 30 feet distance in clay-land; in lighter land the distance will reach 45 feet. There is much land still requiring to be drained. I have about 200 acres under my care belonging to the municipal freemen, and it would be much improved by drainage. I have drained about 10 acres that were in a bad state, and it is now good land: there is not much agricultural land in the borough.”

DRAINAGE OF THE TOWN.—The complaints made at the opening of the inquiry were very numerous, and nearly all had reference to the very defective drainage of the streets, courts, and buildings in the town.

I shall endeavour as much as possible to condense the remarks made during my inspection of the town, as the evidence already given has shown incidentally the deplorable state of the drainage.

A field belonging to the rectory, in the higher part of the town, contains a pond, and also an open cesspool, into which drains from privies empty themselves. It is within 6 yards of the street

called the Ironmarket, and from thence runs along an ancient brook-course. Mr. Stanier, the coroner, said he would rather live on the Pool Dam than where his own house is, on the opposite side of the street. This is the place so strongly alluded to in the evidence of Mr. Spark.

Bridge-street.—The Rising Sun public-house has a cellar, but it is 2 feet deep of foul stinking fluid. It was emptied two years since, and has not been emptied since. A cottage in the same neighbourhood has a cellar in a similar condition. This property is near the churchyard, but at a lower level. There is an offensive well within four yards of the cellar, the water from which is full of flocculent matter. There are no present means of draining the property. The publichouse-keeper's wife had died of cholera, and he and two sons had had diarrhœa. The previous occupant died of consumption. Shadrach Dishley, residing next door, had just recovered from cholera; and Samuel Hayes, adjoining on the other side, died twelve months since of typhus fever. The widow has had choleraic diarrhœa.

The *Holborn Brook* crosses Bridge-street, and the privies there empty into it. There had been eight deaths from cholera.

The *Pool Dam* is, I think, capable of producing all the injury ascribed to it by Mr. Spark and the other medical witnesses.

Upper Green is a wide street, but has no public sewers or drains. A drain is said to run under the houses, and then across the foot-path into the open channel. On the north-west side the courts are narrow: the privies empty into an adjoining field, where all the drainage and refuse flows over the surface of the land. The stench is much complained of; and Mr. Turner, surgeon, says there have been several fatal cases of cholera. The situation is somewhat elevated, the falls good, the premises open, both to the back and front, and ought to be very healthy.

Fletcher-street is similarly situated as to its natural advantages, but is nearly the most unhealthy part of the borough. There is no sewer in the upper part of the street, and in the lower part it is worse than if it were without. There has been at some period a drain 12 inches in diameter made close behind the houses, but it is so completely stopped up that the day-water and slops continually lodge at the back doors.

Lower-green, Mr. Ralph Hand's property. The drains are all stopped up, and the inhabitants complain much of the bad smells.

Higher Land. There are no sewers or drains, nor any supply of water.

In *Penkhull-street*, Mrs. Roberts's property, all the privies and court drain under the house floors. There had just been 3 cases of scarlet fever, and one, a boy, was then lying dead in one of the houses.

Garden-street, Mr. Edwards's property. There are 9 houses,

containing 45 persons, with 2 privies, bad drainage, and no pavement. All the houses have had diarrhœa, 3 cholera, and 1 death. 2 houses belonging to Mr. Kiimmersley have had 4 cases of diarrhœa and 2 of cholera.

Hassell's-street, Fenton's and others' property. 10 houses have all had cholera and diarrhœa. All the sewers in that part of the town unite there; swine are kept at the back, the privies are filthy and the drains foul. In floods the premises are said to be 2 feet deep in water.

James Beech is a lessee under the corporation, but very poor. He has a privy in the cellar, and the sewer passes under the house. 1 case of cholera.

Part of the *Upper Canal* has been long unused for the purpose for which it was made. Near the public walks it is a foul stagnant pool.

Mr. *John Leech*, tanner, said in evidence,—

"I have some property in Merrial-street, and I complain of two dwelling-houses adjoining. The refuse from them comes upon my premises and annoys my tenants. It is next to what is called the 'Happy Land.' If there were proper underground drains to convey all the refuse away, it would be very much better. I think that a general system of drainage is much needed in the town."

Mr. *John Benson Brown* says,—

"I am a wine-merchant, and occupy the premises above complained of by Mr. Leech. The two houses adjoining are the property of Messrs. Shaw and Hinde. The back kitchen and cellar under my house abut upon Mr. Shaw's premises, and we have been suffering four or five years from a nuisance, which we only discovered twelve months ago to proceed from a drain under our kitchen floor. It is merely a brick at the bottom, bricks on edge for the sides, covered with a brick, and then the floor-tiles of the kitchen. Two privies empty their night-soil through this drain. The kitchen is used for cooking and general purposes, and the stench is so great that we can scarcely bear in the house; it comes up into all the rooms, and has been so bad that people could not stay in the place. I was ill twelve months ago of typhus fever, and before I recovered one of my daughters was attacked and died. I had two cases of cholera in the house five weeks ago; one of my daughters' was a severe case, but both recovered. A servant was taken the same day with premonitory symptoms, and was obliged to go away. Dr. Wilson informed me that the diseases with which my family were afflicted were attributable to the offensive smells from the drains. In the front cellar next the road is a public well, with a pump outside, and our cellars are inundated three or four times a-year from its overflowing. It is near the old churchyard, and the drainage from the sewers soaks into it. The water cannot be used. I am obliged to employ two men for seven or eight hours to pump the water out of the cellar, and the stench is then very offensive. It costs me 3s. every time. The water is of a yellowish colour. I anticipate a better state of things if the Public Health Act be applied to Newcastle."

Mr. *Samuel Mason*, draper, says,—

“I am one of the inhabitants of the town engaged in house-to-house visitation, and have had frequent opportunities of witnessing the evils arising from the want of sufficient ventilation, water, drainage, and privy accommodation, both as to the health and morals of the poorer classes; that even where people are disposed to be clean, the bad state of everything connected with their dwellings renders it almost impossible. As the result of the experience thus acquired, I am convinced that extensive alterations and improvements are necessary, and that the Public Health Act only will enable such alterations and improvements to be effected.”

John Hallam, Esq., Mayor, says,—

“I held the office of mayor in the year 1847–8, and was re-elected in August last, in consequence of the death of the late mayor from cholera. His wife died of the same disease a month after. The nurse who attended them also died, and so did the woman who washed their linen. The mayor died on the 29th of July; his was one of the first cases. I am a native of Newcastle, and have a pretty accurate knowledge of the condition of the town. In all matters affecting the health of the inhabitants the borough is very defective. I know that a great portion of the public streets are without sewers, and that in some others the sewers are not sufficiently deep to drain any buildings. At the house in which I live we were obliged some years ago to carry the water out of the cellars two or three days a-week from inefficient drainage. My father expended a considerable sum of money in draining the property, and I believe that many other houses in the town are subjected to considerable influx of water at times. The outfalls of the drainage are bad. The contents of the sewers go into streams, and pollute them. The sewage is also used for irrigation upon land close to the houses, and I think there can be little doubt but that is prejudicial to health. Heretofore the supply of water has been very defective; frequently the supply from the waterworks has not been half sufficient. A better supply is in prospect, and the works are expected to be in operation in a short time. The general outline and contour of the borough is favourable for good drainage. I do not think many towns are so favourably situated in this respect. The springs of water in and about the town are numerous, many of them very copious, and the water of good quality. Naturally, nearly all the circumstances connected with the town are favourable to health. I am aware that it has been very unhealthy, more particularly within the last two years. I attribute that, to a great extent, to accumulations of unremoved animal and vegetable matter, and those more particularly private ones. I hardly think the local Acts are adequate to the removal of these nuisances from private property. *As a practical question, the local Acts have been inoperative in matters affecting the public health.* The local Acts would require indictments to be preferred for the removal of any private nuisances, and the process would be expensive, inconvenient, and attended with delay. If the Public Health Act provide summary remedies for all these evils, it will be a great improvement upon our present authority. I am aware that the Act would constitute the town council the local Board of Health, and

would therefore greatly enlarge their powers; and, judging from past experience, I believe that considerable advantage will accrue to the borough from its application. I have found many difficulties, during the two years I have sat as a magistrate, in applying the local Acts of Parliament to the wants of the borough."

Mr. *J. Cotterill* gives some information in his evidence as to the nature of the existing sewers. He says,—

"The public sewers of the town are under my care, controlled by a committee of the town council. The drainage is very defective. Many of the streets are entirely without drains. There is scarcely any in the town that would drain a cellar. They have been made only to take surface-water; and when a cellar requires draining, the owner of the property has to avail himself of the sloping surface of the town, and continue the deep drain until he can bring it to the level of the sewer. Very few houses are drained. The sewers are of various sizes and forms. There have been few new ones made since I have had to do with them, and those few have been laid with earthenware pipes. The largest pipes I have laid have been 12-inch socket-pipes in Mount Pleasant for about 100 yards. It is for cellar drainage, and has only been completed a few weeks. They appear to act well. The pipes cost 4s. 1½*d.* per yard, and attached to them I advised metal stench-traps 12 inches in diameter, costing 3s. 6*d.* each. The older sewers are certainly not fit for sanitary purposes. The openings into them are not trapped. They might serve, as far as they go, under a sanitary system, for carrying off surface flood-water. The present drains go into the Pool-Dam, the canals, the brook, and the meadows, and are very offensive."

Earthenware pipes are made within half a mile of the town, and can be had 3 inches diameter at 7*d.* per yard; 6 inches, at 1*s.* per yard; 9 inches, at 1*s.* 6*d.* per yard; and 12 inches, at 2*s.* per yard. These would be without sockets or collars; but collars can be supplied at the same rates of about 2*d.* per yard for each additional inch in the diameter.

PRESENT SUPPLY OF WATER.—My Report on the neighbouring town of Burslem, and the mention hereinbefore of the new works for supplying the Potteries and the borough of Newcastle with water, will have informed the Board already that one of the great evils existing will speedily be remedied. To arrive at a proper judgment of the sanitary condition of the borough, and the causes of such a generally high rate of mortality, it is still necessary to show not only the extent of deprivation under which the inhabitants have suffered, but also the frequently contaminated quality of the water they have been compelled to drink. I shall therefore quote from the minutes of inspection a few of the facts that came under my notice, and defer any further remarks upon the new works until the latter part of this Report. The works were not entirely completed at the time of my inquiry, and therefore properly fall under the head of "Remedies."

A mere description of the old Waterworks, or of polluted brooks and wells, and pumps at an inconvenient distance, cannot convey a full idea of the evils arising from the want of a proper water-supply. Water is the basis of the whole sanitary system: it is the agent capable of removing most economically and most efficiently the decomposing matters which, if not removed, pollute and poison the air. The inhabitants are compelled to breathe,—and, inhaling poison, they die. A great portion of the evils set forth in other parts of this Report, under the heads “Drainage,” “Ventilation,” “Filthy Privies,” “Surface Cleansing,” &c., all have their origin in the want of water.

In the year 1795, the mayor, bailiffs, and burgesses of the borough, leased or granted to Joseph Tilstone, hatter, the right of laying pipes in the streets for supplying the inhabitants with water, and the lessee laid a pipe from a spring called the Brownings Well, across the Newcastle-under-Lyme Brook. He also laid down lead and other pipes under some of the streets, and erected an engine to force the water. These works are still in existence, but require no further notice here. They are proved to be utterly inadequate to the wants of the inhabitants, or the Legislature would not have given the New Water Company jurisdiction within the borough.

There are also several public wells and pumps, the expense of maintaining which is defrayed by the council out of the “public improvement rate,” levied under the authority of the local Act.

Sunday's Wells are in the lower part of the town, near Holborn Brook. They are uncovered, with a surface of about 12 feet square. The water is said to be very good, but liable to pollution.

There is a public pump in *Fletcher-street*, the only supply for many houses.

At the *Lower Green* there is a public well, but the water is so bad that it cannot be used for food.

In *May-street*, Higher Land, the ditch on the roadside was dammed up to supply water for cleansing. I was requested to examine the pump-water at the Lamb and Flag inn. It was quite black, and had a most foetid smell.

The *Sytch Well*, close to the open sewer that comes down from the Rectory meadow, has long been in such a state that the inhabitants could not use the water for food.

The *Butchery Pump*, in the Ironmarket, is said to be the best in the town, and the supply never fails.

VENTILATION OF STREETS AND COURTS, CONSTRUCTION OF HOUSES, AND THEIR APPURTENANCES.—Some of the principal streets in the borough are of good width, and allow a free passage of air; but the lanes and back streets are objectionable, and many of the courts admit of no ventilation whatever. Some of these will be noticed in the extracts from my minutes.

In *Rye Croft* there are some houses with no back doors or windows.

Factory-yard, Church-street, is a parallelogram about 50 feet by 17 feet, built up all round to the height of the houses. There are two privies against the houses, no back doors, and many of the windows cannot be opened. The rent of these houses is 1s. 9d. per week and rates. They contain only 2 small rooms. Cholera or diarrhœa had been in every house, and all the inhabitants looked sickly.

Peak's-yard is a very confined place, not more than 18 feet wide, with a row of privies between the houses on each side, and a piggery. The smell was bad, and there had been several cases of cholera.

I examined the court where the first case of cholera occurred, and fully coincide with the opinion expressed by one of the gentlemen who accompanied me, that "the houses ought to be all smashed down." Several are now empty. Louisa Mills is the tenant of one; 3 children had died within a fortnight of scarlet fever, and the mother was then ill of the same disease.

At *Frog Hall* there have been several cases of cholera. A privy on Mr. Joseph Griffiths' property has the cesspool quite full. Mr. Turner, surgeon, said that it overflowed in 1847, and the soil found its way into the Sunday's Wells, and that there was much fever here then.

In *Lower Bath-street*, where the cholera was bad, there are 9 houses without back doors or windows, and 1 inconvenient privy, which empties into the Holborn Brook.

In *Salter's-lane* are 4 houses without a privy. The inhabitants empty the soil into the street grate. 11 houses with 1 privy; cesspool in a horrible state, and soaking through the walls of a house. 5 deaths from cholera.

Liverpool-street.—Thomas Foden said that a house there cost him 95l., and all the refuse drains into it. 5 deaths from cholera out of 9 houses, and diarrhœa in every one.

Fletcher-street, Mr. Samuel Mayer's property. The privies are foul, and very much dilapidated. Mr. M. said that he had ordered them to be rebuilt; but he expected that as soon as they were completed they would be thrown down again; that it was only 12 months since they were made all right. In one of the houses which I examined there had been 4 deaths from typhus fever, and 8 persons were sleeping in the only bedroom.

At No. 21 in the same street the privy is within 5 feet of the kitchen window, full up to the seat, and the liquid filth running on the surface of the confined court-yard. The house was then empty, because the tenant and his wife had died the week but one before of cholera. Two of their children had also had it.

In a house on the opposite side of the street I found the tenant,

Francis Murphy, in the collapsed stage of cholera, with a quantity of poultry and pigeons in the same room.

At the bottom of the same street there are two single-roomed hovels, letting each for 10*d.* per week. *One of them has no window*, and it was occupied by a woman with 4 children; but neither chair, table, bed, nor other furniture. The adjoining one was in the same state, except that it had a window 14 inches by 18 inches. I found that 10 persons had slept there the previous night.

At *Dunkirk* there are 5 houses without any back doors. They belong to the corporation.

At *The Hole*, in Lower Green, No. 67, there were 2 cases of cholera and 1 death 10 days previously, in a room only 6 feet by 9 feet by 7 feet.

Leech's-row consists of some dilapidated cabins set back to back. On one side they are single rooms only, 15 by 8 by 8 feet; and the others have chambers over. The rents 9*d.* to 1*s.* 2*d.* per week. I should not value the fee simple at more than about 5*l.* per cabin, and human beings ought not to be permitted to live in them.

Carr's-yard, in Lower-street, is a close, ill-ventilated place, only about 4½ feet wide to the extent. Cholera has been there. The houses are said to be lodging-houses and brothels.

In *Friar-street* and *Church-street*, which rise considerably, the privy cesspools are placed successively one above another at the backs of the houses, and there is an offensive drainage from many of them to the premises next below. There has been much fever and cholera there. Some cottages belonging to His Grace the Duke of Sutherland have a very bad privy.

Penkhull-street.—The back premises of Mrs. Price's property are very much confined, and the privies foul. John Booth's wife, living in one of the houses, has had typhus fever two successive years. Francis Tittensor's property consists of 3 very dilapidated thatched cottages. In one of them was a woman in bed ill of fever. There are 12 houses in a close, confined court, called White Horse-yard, with a large open cesspool, and the drainage from another flows on the adjoining property.

Ashley's-square is a cul-de-sac with foul privies, and no back doors to the houses. Mr. Hallam, surgeon, said he had had fever there.

Stubbs-street.—James Galley's property: 4 houses have no privy.

Market-lane.—The two upper houses have no back door or privy. Mr. George Cliffe's property consists of 7 houses, with a back yard, but all the ashes and privy-soil have to be carried through the houses. One of the tenants says they allow it in turns to be carried through their houses. 2 of the houses have no back doors or privies.

Ironmarket. — Read's-yard has a large cesspool, which is complained of by the occupants of the houses in Hadderton's-yard below. Thomas Perkins's wife says—"I have whitewashed and kept the house as clean as I could, but the refuse comes through and runs down the walls; I have used gas-tar to paint part of the wall." George Barlow, in the adjoining house, made a similar complaint. These houses have no back doors, and their own privies are within 5 feet of the doors, with a large open cesspool, 12 feet long, 9 feet wide, and about 5 feet deep, from whence 7 loads of refuse had just been taken.

In *Bagnall-street*, and also in *Windsor-street*, the back premises are very much confined, and the foul privies consequently close to the houses. There has been much cholera and diarrhœa in both places.

Such are some of the constructive defects of the buildings in Newcastle, and the sad consequences which have resulted. It is certainly impossible practically to reconstruct the town; but there is no essential reason why a privy within 5 feet should be any more offensive than a water-closet within the house itself; and yet the former is found to jeopardize and destroy life, while the latter is kept perfectly sweet and clean. The difference consists in water and drainage, and the peculiar constructive condition of parts of Newcastle only renders an abundant supply of water, and an efficient system of drainage, the more indispensably necessary.

CROWDED DWELLINGS AND CONDITION OF LODGING-HOUSES. —The lodging-houses in Newcastle are so numerous, and exert so great influence upon the sanitary condition of the borough, that I have thought it right to give them a special consideration.

They are divided into three classes:—1. Brothels; 2. Houses for tramps; and, 3. Houses for Irish.

The first and second of these do not present any distinguishing features from similar places in other towns. The third appear to be much more numerous than at first sight one would expect. Newcastle appears to be a convenient centre for the whole of the district, and therefore the Irish make it their place of abode. Men, women, and children are ostensibly traders in something, and all the towns in the Potteries are easily accessible from Newcastle. The consequence is that many Irish reside in the town, not exactly as a fluctuating population like the tramps, but going out in the daytime with their various articles of petty merchandize, and returning in the evening, when they crowd together in large numbers for the night, the houses which accommodate them being chiefly in the most unhealthy parts of the town. From information, for which I am indebted to Mr. Cotterill, it appears that there are 52 common lodging-houses in the borough: 1 is for respectable Jew pedlars; 24 for Irish labourers, few of whom, he says, have any

visible means of living, except harvest-men; 6 for decent working men, with clean beds, and not crowded; and 21 harbouring low prostitutes, travelling dog-cart thieves, mendicants, &c.

“In most of these places the rooms are crowded to excess; the sexes indiscriminately mix; the houses are very filthy, and without ventilation. Such places afford every facility for crime.”

Mr. *Turner*, surgeon, says of these places in his evidence,—

“There have been many cases of cholera in *Fletcher-street* and in *Lower Green* in lodging-houses. Many houses in my district have no back doors, and a large portion of the population is Irish. They are generally persons of filthy habits, and live mostly in public lodging-houses. Sometimes there are ten or twelve persons in a house with generally not more than two sleeping-rooms, and in some instances only one. These are generally persons of indifferent character, obtaining their living by the sale of small articles and by begging. They are not generally tramps, but often persons who have resided some time in the town.”

Many of these houses I visited after the inmates had retired to rest, and found them in the state described by the witnesses. I think it better, however, not to lengthen this part of my Report by detailing the facts which came under my own observation. I witnessed sufficient to convince me that the provisions for the regulation of lodging-houses are of great importance to the borough.

The town clerk, to whom I am indebted for many other important documents connected with this inquiry, has furnished me with a copy of bye-laws ordered and made by the town council at a meeting in August last, for the regulation of these lodging-houses.

1. Provides that all lodging-houses shall be registered. 2. That a copy of the bye-laws shall be affixed up in each such house, and also a statement of the number of persons allowed to be accommodated. 3. That these papers shall not be defaced. 4. A penalty for admitting more lodgers than allowed. 5. That such houses shall be open to inspection. 6. Males and females not to be in the same room, except married, or children under twelve years old. 7. That the lodgers shall have proper beds, and that such beds shall not contain more than two persons, unless they be children, or the bed at least 5 feet wide. 8. Prostitutes, thieves, and disorderly persons not to be admitted. 9. Lodgers to have water, soap, and towels provided. 10. The floors to be washed every Wednesday and Saturday. 11. The houses to be white-washed four times a-year. 12. The bedding to be cleansed four times a-year. 13. The keeper is to give notice to the public authority of any person infected with fever or other infectious disease, and to adopt such measures as may be directed. 14. Superintendent of police may order the healthy inmates to be removed. 15. The bedding, after any fever, &c., to be fumigated and cleansed. 16. Penalty for not doing it, or allowing any lodger to

sleep thereon. 27. Every lodging-house to have a proper privy or water-closet.

CONDITION OF THE ROADS, PAVEMENT, SURFACE-CLEANSING, AND PUBLIC NUISANCES.—The pavement of the principal roads is in good condition, but some of them are macadamized, and the material used for such purpose is of inferior quality. It is not possible to maintain a good road with such material without a great waste of labour and money. The surface in the Ironmarket had been recently repaired, and in a short time the whole of the stone at the west end would be reduced to mud. The most economical pavement in the town, and the most durable for carriage-ways, is that of pebbles or boulders. It does not form a smooth road, but will last more than ten times as long, and not cost one-sixth as much, as that macadamized, with an equal traffic. Some of the principal roads in the borough are turnpikes, under the management of trustees.

Fletcher-street has been already named for numerous defects and great mortality. The street is only 20 feet wide, and the carriage-way is unpaved.

There are numerous streets in the *Higher Land*, none of the carriage-ways of which have been ever repaired.

The *George-street district* also contains many new streets in a precisely similar condition.

I should say that in the court-yards paving would be the exception, and the surface is consequently saturated with moisture and the drainage from animal and vegetable refuse.

Gas concrete has been used upon the public footways in some of the secondary streets, but it is not well executed.

Mr. *Isaac Cotterill*, who has had charge of the highways in the borough for the last twelve years, says in his evidence,—

“The total length of the public highways under my care is $3\frac{1}{4}$ miles. Attached to these are footpaths, and others on the turnpike-roads, making a total of $3\frac{1}{2}$ miles. Blue bricks are used for the public footways. They cost about 40s. per thousand. In some places kerbstones are used. They come from the neighbourhood of Macclesfield, about 20 miles distant, and cost about 9d. per yard. They are about $2\frac{1}{2}$ inches thick, and 18 inches deep. Gas concrete has been laid down, but for footpaths chiefly. I use the refuse from the calcining of iron with gas-tar; and, where the roads are nearly level, I occasionally mix it with macadamizing materials and the ashes from engines. I take all the refuse made by burning at the gas-works, and pay for it, when mixed with tar, 4d. per load. After it is laid down and raked, I spread over it a covering of gravel, and find it to answer very well. It will last for years. I have occasionally used the refuse from flint-mills, and it gives it a white cast, and assists it to wear. It is rolled with an iron roller. I cannot give you the separate length of the boulder pavement, or the macadamized roads. When I came to the town there was a fever for macadamizing, and the roads had been torn up, and not laid

down again. Before that time the pavement was almost entirely boulders. I have taken up some boulder roads, because the stones were so very large, and have substituted macadamized surface for them. I am quite convinced that paved roads are the best and the cheapest in the end. I have never had to purchase any boulders, except in very small quantities. They are worth 6s. to 7s. per ton. We set them in sand chiefly, but occasionally in mine-ashes. We provide sand and ashes, which each cost 2s. per load. The labour of laying down the pavement costs $3\frac{1}{2}d.$ per square yard. Macadamized roads have been heretofore made with furnace-cinders, which cost, laid down, 1s. 6d. per ton, and the breaking 6d. The spreading and attention by the day. The hot-blast has caused the quality of the cinders to become so bad, that on some parts I am discontinuing them, and am using a kind of Bosley stone, costing 8s. per ton broken. The cinders put on one month have to be scraped off the next."

The highways in the borough, open to the use of the public, are not less than $10\frac{1}{2}$ miles long according to the plan, and therefore, if the length repaired by the public authorities does not exceed the statement of Mr. Cotterill, it must follow that fully two-thirds of the roads are private property.

The highway-rates have been lately $4\frac{1}{2}d.$ in the pound, and the average expenditure for the last 5 years is 222l. 17s. $5\frac{1}{2}d.$

The above includes the sum of 20l. per annum paid under contract for scavengering. The amount is a strong indication that the quantity of work executed in this department is not very extensive. I drew Mr. Cotterill's attention to this point, and to an improved method of cleansing, not only the public highways, but the whole surface of the town. The following is his evidence:—

"If I had plenty of water I could cleanse the boulder pavements with jets of water certainly, and expect to be able to do so. I could wash the gas concrete in the same way. The present macadamized roads could not be so cleansed, nor could the courtyards with their present surface, but if paved with gas concrete they could. If either concrete or pavement was also laid down in place of the present macadamized surface, there would be no difficulty in washing the whole surface of the town two or three times a-week. That washing would also flush the sewers and drains at the same time, if there were any necessity for flushing."

The principal public nuisances complained of are some irrigated meadows almost close to the houses. It is admitted that the sewage causes the land to be much more fertile, but the objection of the meadows being close to the houses is one entitled to consideration. My examination convinced me that the operations have not been carried on in a systematic manner. The fertilising fluid is passed along open channels from which there is much evaporation, and it is used in too concentrated a condition. The sewage is found to be in the most productive state when so diluted that the smell is scarcely perceptible. It ought also to be laid evenly over the surface with the hose and jet-pipe, so as

to be absorbed by the vegetation, instead of polluting the atmosphere. There were also complaints of the offensive smells from slaughter-houses, candle-houses, and bone-boiling premises; but the chief of these had reference to Mr. John Leech's tanyard adjoining the brook. A large quantity of pigs are kept there, and bones, horse-flesh, intestines, and garbage are said to be boiled for them close to the public road. The whole surface in the neighbourhood of the piggeries was in a very filthy condition. The complainants said that flesh was boiled when in a putrid condition. Mr. Leech said that horse-flesh had been boiled there 25 years, but never in a putrid state, and that the bowels are buried. The tan-yard is in one of the lowest parts of the town, and there had been, and was at the time of my inspection, cholera all around it.

INSURANCE, FIRES, AND MEANS OF EXTINGUISHING THEM.—The buildings in Newcastle are generally insured; and though it has been my duty to point out many constructive defects, yet the salutary clause in the local Act of Parliament relative to thatched buildings has almost effected their entire removal. Party-walls are seldom built; but still I think I have seen few towns in which there is so little ground for apprehending fires. Mr. J. Cotterill is the superintendent of the fire-brigade, and says, in his evidence on this part of the inquiry—

“Fires are not at all frequent. We have three engines, and one of them is nearly new and very powerful. They are brought out four times a-year, and occasionally to wash the streets. The brigade consists of twenty-four men, including our two policemen. There is a fire-bell to call them together. The town council gives 15*l.* per annum, which is divided among them; but there is no scale of remuneration. As far as the engines and men are concerned, we have been able to cope with any fire, without its spreading to adjoining buildings. There are fire-plugs in various parts of the town upon the mains. The mains are not always charged. There is a deficiency of water at any period for fires. I expect when the new waterworks are completed to have abundance of water for extinguishing fires, and to be able to dispense with the engines to a considerable extent. There is no fire-escape in the town.”

GAS-WORKS AND LIGHTING.—It is a remarkable circumstance in the local arrangements of Newcastle, that, while the old waterworks are situated in the lowest part of the town, and the supply has to be forced up from the level of the brook, the gas-works are placed in the upper part of the town, and the supply has to be forced downward. In the early part of this Report I have quoted the title of the Gaslight Act, from which it will be seen that it was passed soon after this mode of lighting towns was discovered, which may probably account for the selection of an improper site for the works.

The quality of the gas appears to be good. There are about

120 public lamps, which burn bat-wings during the hours of darkness from September to the end of April, with intervals of two nights before and two nights after full moon. The lamps belong to the company, who light, extinguish, and repair them under contract with the council, acting as commissioners under the local Improvement Act. The price is 44s. per lamp. The works are let on lease to Mr. *Charles Lawton*, who gave the following evidence:—

“I took the gas-works from the company in 1844, on a lease of seven years, and manage them myself. I had had no previous experience in the management of gas-works. The concern was one of the first established, and is situated in the higher part of the town. That is a great disadvantage; but we have now got a holder in the lower part of the town, and have a distinct main for it. The works are in good condition. We use three retorts only in summer, and from nine to twelve in winter. We are using clay retorts now, and have abandoned iron altogether. I consider clay better upon the whole. We obtain the principal part of our coal from *Apedale*, about $2\frac{1}{2}$ miles distant. We have no station-meter, and ascertain an escape only by the holder going down. The consumption is chiefly by contract. Union jets are charged 5s. each per quarter, and batwings 12s. each. There are scarcely any argands in the town. The coals cost 10s. 10d. per ton, and Derbyshire lime 16s. 8d. The spent lime is quite a drug, and we sell it at 1s. per load. *The ammonia water is thrown away into the brook as waste.* Mr. *Cotterill* takes a good deal of the tar, and we burn some of it in the beds. I should be glad to sell it at a penny a gallon. We sell the eoke at 10s. per ton. I do not think any of the mains want renewing. The nominal capital of the company is 5000*l.*, in 200 shares of 25*l.* The borrowed capital is 1200*l.* in addition. The shares are about at par. My contract will expire in about a year and a half. I am not a shareholder. I pay the company 350*l.* per annum.”

STATE OF THE BURIAL-GROUNDS,—There is a strong feeling in the town that the crowded state of the parish-church burial-ground has been very injurious to the inhabitants in its vicinity, and I think this is borne out by the evidence of the medical witnesses. There is a large burial-ground attached to St. George's church, and there are several small ones connected with dissenting chapels.

I found on inspection that the parish burial-ground is 9 or 10 feet above the level of Church-street, and that it has all the appearance of being crowded. The soil is mixed, of clay and the disintegration of the lower red sandstone. The area, exclusive of the church, is 4099 yards; the site of the church, 711 yards; the whole being less than an acre. The aggregate number of interments in the last 20 years is 3838. Average yearly, 192. Exclusive of the site of the church there would be 1757 graves of 7 feet by 3 feet each, if they were packed closely together up to the very walls, and no room lost. If even the interments took place regularly over the surface, the whole ground would be

turned over in nine years and about six weeks. Many graves have however been reopened in a much shorter period than that. My previous experience enables me to affirm confidently that in no part of this ground would perfect decomposition take place under 15 years, and in the greater portion 20 years would be required.

The evil consequences of such a burial-ground, surrounded by a dense population, appear to be so direct that I cannot forbear quoting some of the evidence given during the inquiry. The Superintendent of the Police stated that he had seen graves opened from which partly decomposed bodies had to be removed, and that the soakage from the graves frequently found its way through the wall, and ran into Church-street.

Mr. *Samuel Mason*, draper and undertaker, said,—

“Having been engaged with funerals in the parish churchyard, I have frequently seen bodies interred with the lid of the coffin not more than 3 feet below the surface of the ground, particularly in the lower part of the churchyard, which I believe to be the most dangerous, and which is in a very crowded state.”

Dr. *Wilson* says in his evidence,—

“Generally, all burial-grounds ought to be out of towns. With special reference to the parish burial-ground, if what the police superintendent stated this morning be true, then I should say that it is dangerous to health. Nobody can for an instant imagine it safe to have parts of the human body in a state of decay issuing through the walls, and flowing down the gutters. In corroboration of this there have been no less than 10 deaths from cholera in Church-street.

Church-street is short, with only about 20 houses in it.

Mr. *Dudley*, surgeon, says,—

“I think the old churchyard is in a highly objectionable state. It is so crowded, that they are frequently obliged to remove coffins to make room for additional interments.”

Mr. *Spark*, surgeon, says,—

“The parish-church burial-ground I know to be very crowded. I have seen the fluid coming through the churchyard wall. I think it ought to be closed; and I very much question the propriety of continuing to inter in St. George’s churchyard, because every new interment brings the graves nearer to human dwellings. In the first instance the cholera broke out near the old churchyard, and seemed to spread round it,—to wit, in *Blue Ball-yard*, and from thence in *Bridge-street*, *Church-lane*, and along *Lower-street*. The lower part of St. George’s churchyard is now so wet that water is found at 4 feet deep. I have very little doubt that water drains out of the churchyard into the pond belonging to Mr. Stanier, and thence percolates into my cellar and those of my neighbours.”

A few of the bodies of persons who had died of cholera were buried in the parish churchyard, but the greater part in St. George’s churchyard; and Mr. *Mason*, whose evidence has been already quoted, says,—

“ During the present epidemic cholera I have frequently visited St. George’s churchyard, and I believe it will be prejudicial to the health of the town. From inquiries which I have made from the sexton on the spot, I find that the graves intended for people who had died of cholera were dug 12 feet deep, but that they were filled to within 3 feet of the surface.”

There is a considerable extent of ground attached to St. George’s church, and the greater portion has not yet been used, but is fenced off, and at present let as a field. The whole area is 13,212 yards, from which about 1815 yards must be deducted for the site of the church, and land immediately surrounding it not used for graves.

There is a small burial-ground attached to the old Wesleyan chapel, but it does not appear to be crowded.

The Roman Catholic chapel has also a small burial-ground, in which some cholera bodies have been interred. It is said not to be crowded at present, but it will soon become so if no check be interposed.

REMEDIES.

Having now treated of the various important subjects connected with the sanitary condition of the borough of Newcastle-under-Lyme, so far as its present state is concerned, it becomes my duty to point out such remedies as suggest themselves from this preliminary inquiry. I may repeat what has been already stated, that Newcastle ought to be a healthy town. There is nothing to make it necessarily unhealthy, and the works required for its sanitary improvement may be constructed economically and efficiently. The site of the town offers no engineering difficulties, and, unless it be with reference to the Pool Dam, I can see no pecuniary impediment.

The excessive disease and mortality of the borough demand immediate measures of improvement, and the Public Health Act contemplates and provides the remedies necessary.

IMPROVED WATER SUPPLY.—I have in the earlier part of this Report alluded to the importance of a water-supply as a sanitary agent. The Public Health Act requires that the water given shall be PROPER; and in considering any proposed supply we must ascertain if it complies with the requirements of the Act. Four essential qualifications are necessary in order that the supply may be PROPER.

1. *It must be pure in quality*, well aerated, and free from organic or inorganic matter, either in mechanical suspension or chemical solution.

2. *Abundant in quantity*, so that it can be used for all necessary and useful purposes, without fear of deficiency, or the necessity of storing it in butts or cisterns until it has become vapid and unfit for use : in fact, to be abundant in quantity, it must be *constantly on*.

3. *It must be convenient of access*, namely, at such pressure as will convey it to the place where it may be wanted. This condition cannot be complied with unless there be a tap in every house, and a force capable of carrying the water to the top story of such house.

And lastly, *It must be cheap*, so that the poorest cottager can have it without feeling the payment to be burdensome.

The uses to which water must be applied under any proper sanitary system are many, and the quantity necessary will therefore be large. It has been calculated by those who have paid most attention to the subject, that for food, washing of linen, cleansing, and other domestic purposes; for keeping in healthy action a proper system of public and private drainage; for stables, breweries, and manufacturing purposes; for extinguishing fires; for washing, cleansing, and watering the roads, courts, and the general surface of a town at stated periods; and for all the other purposes to which a proper supply may be made serviceable for the health and convenience of the inhabitants, from 20 to 25 gallons per day for each individual of the population will be required.

I now come to consider how far the new works constructed by the Staffordshire Potteries Waterworks Company answer these requirements.

In obtaining a knowledge of the works I am under great obligations to *Liddle Elliot, Esq.*, the engineer to the company, who went with me over the ground, and gave me all the information in his power.

The site of the works is at Wall Grange, in the parish of Leek, and upon the estate of his Grace the Duke of Sutherland. The distance from Newcastle is 11 or 12 miles. The water is derived from some most powerful springs in the Churnet valley, and the company have been enabled by Parliament to appropriate them to the wants of the Potteries and Newcastle, on condition of making a large compensation-reservoir for the use of the mill-owners below. The water is pumped by engine power up a very steep incline to a reservoir on a place called Ladder Edge Common. From thence it passes by an iron main to the service-reservoir, capable of containing half a million of cubic feet, situate in the lordship of Abbey Hulton, in the parish of Burslem, and is then distributed by smaller mains to the several towns to be supplied.

As to the quality of the water, the following is the analysis of R. Phillips, Esq.:—

"Museum of Economic Geology, Craig's Court, Charing Cross,
6th February, 1847.

GENTLEMEN,

"I have analysed the water which you sent to me from a spring at Wall Grange, near Leek, and I find that 1 gallon of it yields 12 grains and $\frac{2}{100}$ of a grain of solid residue by evaporation. This I found to consist, as nearly as possible, of

	Grains.
"Common salt	1·33
Sulphate of lime	5·79
Carbonate of lime	4·73
With traces of magnesia, silica, organic matter, } and loss in operating }	0·41
Total	12·26

"According to Dr. Clarke's test for hardness, that of the spring water is 9 in the gallon.

(Signed) "R. PHILLIPS."

The quantity of organic matter is exceedingly small, and the supply suitable for domestic and other purposes where comparatively soft water is requisite.

As to the quantity, the solicitor to the company, *Joseph Alcock*, Esq., says,—

"Twenty gallons of water can be given per day to each man, woman, and child in the district, and the supply is to be constant."

The same gentleman also shows that it will be easy of access to those who need it :—

"Wherever the inhabitants are too poor to pay for house-services the company will lay them, on receipt of 10 per centum of the cost, as an addition to the annual rate. That will include the repairs. There may be a tap in every house."

The following scale of rates, which the company is authorized to charge, will show that the water will be within the reach of the poorest inhabitants as to price :—

	£.	£.	Per Annum.
"Houses not exceeding	6		s.
" " exceeding	6 to 7	annual value	6
" " "	7 to 8	"	7
" " "	8 to 9	"	8
" " "	9 to 10	"	9
" " "	10 to 11	"	10
" " "	11 to 12	"	11
" " "	12 to 13	"	12
" " "	13 to 14	"	13
" " "	14 to 15	"	14
" " "	15 to 16	"	15
" " "	16 to 17	"	16
" " "	17 to 18	"	17
" " "	18 to 20	"	18
" " "	20 to 21	"	20
" " "		"	21

		Per Annum.	
Houses exceeding		£.	£.
		21 to 22	22 annual value
"	"	22 to 23	" 23
"	"	23 to 24	" 24
"	"	24 to 26	" 26
"	"	26 to 28	" 28
"	"	28 to 30	" 30
"	"	30 to 35	" 34
"	"	35 to 40	" 38
"	"	40 to 45	" 42
"	"	45 to 50	" 45
"	"	50 to 55	" 48
"	"	55 to 60	" 51
"	"	60 to 65	" 54
"	"	65 to 70	" 57
"	"	70 to 80	" 62
"	"	80 to 90	" 66
"	"	90 to 100	" 70
"	"	100 to 110	" 72
"	"	110 to 120	" 78
"	"	120 to 130	" 80
"	"	130 to 140	" 82
"	"	140 to 150	" 84
"	"	150	3l. per centum per annum.

"And for every water-closet there shall be paid a sum not exceeding 10s. per annum."

Now one of the most important features in the sanitary improvement of the borough of Newcastle will be the immediate removal of the soil in underground channels from the privies of the cottages, by means of water and the use of soil-pan, or other cheap apparatus in the nature of water-closet; and as the charge here authorized is for the water, and not for any particular apparatus, I fear that a difficulty may arise if the company should insist upon the terms of the Act. They are, however, persons who have a large interest in the district, and sanitary improvement has been a strong inducement with them in the construction of the works. I do not apprehend, therefore, that the town council would have any difficulty in arranging the matter. Indeed, as the Amendment Act of the company places them under the provisions of the Public Health Act, I think they would probably be governed by the clause which fixes the maximum charge at 2d. per week per house.

So far as concerns the charges for water to the houses, it appears, from the table showing the rateable value of the houses, that about two-thirds of all the houses in the borough could not be charged more than 1½d. per week per house.

Mr. *Elliot* says in his evidence,—

"The only material change which has taken place since the inquiring officers held their court before the passing of the company's Act

PART OF NEWCASTLE UNDER LYNE.

Shewing proposed Drainage

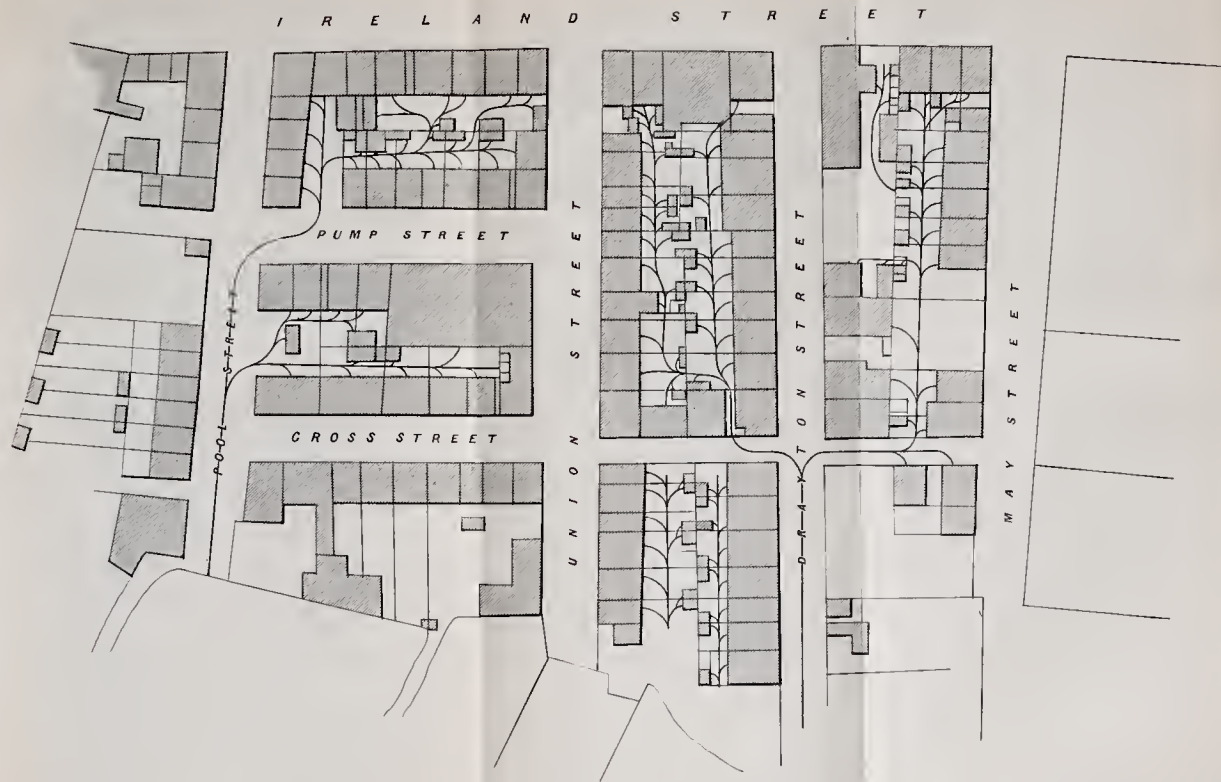
PLAN 1.



PART OF NEWCASTLE UNDER LYNE.

Shewing Proposed Drainage.

PLAN II.



Scale, 66 Feet to One Inch.

has been the purchase by the company of the Duke of Sutherland's waterworks at Longton. The effect of that purchase has been to increase very much the capability of the company,—to the extent of three-quarters of a million per day.

“There is one fact in connection with that purchase which I think ought to be mentioned. I refer to the extension of the supply to Fenton. In 1832 the cholera was very malignant there, more so than in any other part of the district for the number of the inhabitants; and they had then no public supply of water. We began to supply them fully on Lady-day last; and during the recent visitation I am told they have not had one case of cholera, and only one case of diarrhœa. This is attributed, by those able to form a judgment, to the excellent supply of water now given. The impression in Longton is that there was no case of cholera there in 1832. They were then supplied by the Duke of Sutherland's works. Nor have they had it during the recent visitation. In all the other towns in the district the cholera has been recently very malignant, and the aggregate supply of water has not exceeded half a million. We propose to give three millions, and our works are capable of any extension.”

It will be quite unnecessary to add anything to show that the company is able and prepared to give to the borough of Newcastle a PROPER supply of water.

IMPROVED DRAINAGE.—It has been already stated that the general inclination of the surface is considerable, and that the town can be well and economically drained. I now proceed to explain, as shortly as possible, how this may be done. I do not think any existing sewer in Newcastle would be of use, or could be made to fit into any proper system of drainage; and therefore I should leave them as they are to take the surface-water from the public highways, and lay down a new set, entirely constructed of earthenware pipes, at such depths as to drain the basements, cellars, and foundations of buildings. Every house and sinkstone, every court-yard and fall-pipe from the roof, should be connected by house and court drains with the public pipes in the street. Every watercloset or privy, improved for the cottages by the substitution of soil-pan apparatus instead of the present offensive, stinking cesspool, should be also connected with the street-pipes by similar drains; and every opening from court, house, or privy should be trapped with syphons. No deposit would ever take place in such drains, properly constructed and put together, in a town so favourable for drainage, and having a good supply of water. The whole of the drains would converge, near the south end of Goose-street, into one larger pipe, which would convey the sewage along the road, parallel to the brook, for a distance of a mile and a half, where it could be used to irrigate the land without any fear that it would be injurious to the inhabitants.

The accompanying plans will show the mode of laying down such drainage for the accommodation of blocks of buildings in

the town. In No. 1 I have selected an old and irregularly built part of the town, containing both large and small houses, and in No. 2 a part more recent, and more easily arranged, consisting almost entirely of cottages. Without large working plans and sections it would be impossible to give a correct general estimate of the cost of draining the whole borough; but with the simple data of the length of road, the price of pipes, and the number of houses that may be so drained, I submit the following as a probable estimate for efficient works, all due economy being exercised in the execution:—

Estimate for Draining Buildings in the Borough.

Street drains	£3400
House and court drains, including soil-pan apparatus for closets and privies	3325
Conveying-pipe for sewage below the town	660
	<hr/>
	£7385

The works contemplated, and many others provided for by the Public Health Act, are in the nature of permanent improvements and additions to the value of the property; and therefore it would not be equitable, as a general principle, that the present owners, some of whom may have very limited fixed incomes from the property to be improved, should be compelled to pay down in one sum for that which may be more beneficial to their successors than themselves. Such payments would also, doubtless, be a hardship on persons having only a life interest in, or other precarious tenure of, house property; and the same remark would be applicable to mortgagees in possession, who might experience difficulty in obtaining interest for their money. A similar difficulty would arise if the first cost of the public portion of the works had to be at once obtained by rates. The Legislature foresaw this, and wisely provided, in the Public Health Act, that money may be borrowed by the local Board of Health, and repaid by equal annual instalments of principal and interest in a period not exceeding 30 years; so that neither the public nor private improvements can be felt as a burden upon the ratepayers or the owners of property.

To apply this principle to the general estimate before us. The money being borrowed on the recommendation of the General Board of Health from the national exchequer, and the works being completed, the annual instalment to repay 7385*l.* in 30 years, with interest, would amount to 447*l.* 10*s.* 1*d.* per annum; or, for 1900 houses, the sum of 4*s.* 8½*d.* each, or a fraction only above *one penny* per week per house.

But it would still be unfair that the owner of cottage property should pay as much per house for drainage as would be paid by the large houses in the borough, and therefore it may be confidently stated that no cottage need be called upon for more than

one penny per week for a system of underground drainage, in which shall be immediately carried away all the nightsoil, slops, and other refuse, before decomposition liberates those obnoxious gases which now commit such fearful ravages among the population.

THOROUGH-DRAINAGE OF AGRICULTURAL LAND—The medical evidence has proved that there is superabundant moisture in the atmosphere, and that it is injurious to health. It is also proved that, although the area of the borough is not large, a great portion of the land is undrained; and that, where land has been drained, it has been much improved in value. It thus appears that the thorough-drainage of the agricultural land in the borough would not only be beneficial to the farmer, but also to the inhabitants of the town. The same principle of distribution of charges over a term of years would be, under such circumstances, as applicable to the land as to buildings; so that, if a farmer had his land drained under the supervision of the local authorities, at a cost of say 5*l.* per acre, he could have the privilege of paying a “private improvement rate” of 5*s.* 11*d.* per acre for 30 years, instead of being compelled to pay down the whole sum; and if in the mean time he should remove from his farm, his successor, deriving the benefit, would have to repay the remaining annual instalments.

SEWAGE DISTRIBUTION.—Some of the meadows in the borough are said to have been irrigated now 40 years, and therefore the inhabitants have had an opportunity of witnessing the fertilising properties of water containing but a small quantity of town refuse. I saw a heavy crop of grass being cut in one of these fields so late in the season as the month of October. But besides the objection of the land being too close to the houses, the sewage is not used in such a way as to obtain the great results which have been found to follow its scientific application in other places. The land should be first properly drained of its superabundant moisture, in order that the liquid manure may at once find its way to the roots of the plants; and the application by jet, so that it can fall as a shower, is much more efficacious than by trench irrigation, where one part of the land gets too much of the fluid, and another too little.

The great value of the sewage of towns has been abundantly proved, not only by chemical analysis, but also by practical experiment. I forbear quoting examples only because this Report has already exceeded the limits within which I was anxious to confine it; but I must add, that, as all contribute to its production, it is truly public property, and instead of being either wasted, or allowed to remain in the town so as to injure the public health, it should be conveyed to the agricultural land, and properly applied. Its value would then be seen, and there can be no doubt that the town council would derive from it a considerable revenue.

IMPROVED PAVING.—I would recommend that as soon as possible all the macadamized roads in the borough should be abolished, because they are by far the most expensive, the least durable, and have the greatest draught of any description of carriage-road that can be constructed. In the town especially, I should recommend their discontinuance on sanitary grounds, as well as on those which I have enumerated. They are always absorbent, and for a great part of the year a considerable evaporation is going on from the whole surface. They are filthy, and the vapour given off is accompanied by emanations from the refuse lying at the time upon the surface. It is almost impossible for either the houses or the inhabitants in their immediate vicinity to keep themselves free from mire in winter, and dust in summer. I would substitute the best stone pavement accessible in all the principal thoroughfares, and in the inferior streets, lanes, and alleys, would lay down gas concrete, which is cheap, durable, impervious to moisture, and, if properly constructed, free from both dust and mud. For the court-yards and footpaths I would also lay down concrete, which for such purposes would not need to cost more than 9*d.* or 10*d.* per square yard. If the price were even a shilling, and the large quantity of 20 yards were taken for each house, the charge as a “private improvement rate,” on the principle of distributed payments, would be repaid with interest in 20 years at the rate of *one farthing per week per house*.

IMPROVED CLEANSING OF STREETS, COURTS, &c.—Having obtained an abundant supply of water under pressure, with fire-plugs, which the company have undertaken to fix at proper intervals without charge,—and having provided a system of drainage for the removal underground of all refuse,—and smooth impervious pavement of the streets, lanes, alleys, courts, and footpaths, the whole surface of the town could be washed, and made quite clean, at least twice a-week, with flexible hose and jets of water, at a cost not exceeding *one halfpenny per week per house*.

CLOSING OF BURIAL-GROUNDS.—The evils connected with the present condition of the parish-church burial-ground have been pointed out at so much length, that it is unnecessary to add anything here. I think the ground ought to be closed, except under such regulations as the General Board of Health may from time to time allow. I am also of opinion that further interments should be prohibited in the smaller grounds attached to the various dissenting chapels, except under similar restrictions,—that no additional ground on the south side of St. George’s church should be appropriated as burial-ground, beyond that which has been already used for such purpose,—and that a proper parish cemetery should be laid out, as soon as possible, at a sufficient distance from the town to be convenient, and yet to protect the living inhabitants from the evils to which they are now exposed.

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS.

The following is a summary of the conclusions and recommendations which it is my duty to lay before the Board for their approval:—

I. That epidemic diseases are very frequent and fatal;—that in 1847 more than $9\frac{1}{3}$ to a thousand of the population died of typhus fever;—that during 9 weeks only of the present year nearly $22\frac{1}{2}$ to a thousand died of cholera and diarrhœa;—and that, exclusive of these, the average mortality for 7 years is 28 to a thousand of the population.

II. That low typhoid fever is endemic in the town.

III. That, with the exception of the new waterworks, all the local arrangements having reference to the health of the inhabitants are very defective.

IV. That many houses in the town are entirely without privies, and that, where such appurtenances do exist, they are mostly near to the houses, have offensive cesspools, are defective in construction, and are proved to have been very productive of disease.

V. That the Pool-Dam is highly injurious to the health of the inhabitants, being the receptacle of large quantities of animal and vegetable substances, and also because it renders the atmosphere excessively humid.

VI. That there are numerous lodging-houses in the town;—that they are overcrowded;—that disease is engendered in them amidst filth and wretchedness;—and that many of them are scenes of the grossest immorality.

VII. That the position of the town, and other circumstances connected with it, are *naturally* favourable to the health of the inhabitants.

VIII. That the health of the inhabitants will be improved by the opening of the works recently constructed by the Staffordshire Potteries Waterworks Company.

IX. That the health of the town would be still further improved—

1. By a system of drainage of the site of the town, including the houses and courts; by the abolition of all privies as at present constructed, and the substitution of soil-pan apparatus, and also by the construction of additional privies or water-closets, so that there shall not be in any case more than three families to one privy. All these privies to have proper drains to convey the refuse away in underground channels.

2. By the better drainage of the suburban agricultural lands.
3. By the removal of all accumulations of decomposing refuse.
4. By improved paving of streets, courts, and alleys; and by improved surface-cleansing.

X. That such of these objects as are of the nature of public works may probably be accomplished at the following rates per week for a cottage-house:—

1. A system of complete drainage of all premises, including the use of soil-pan apparatus, at *one penny*.
2. Clean, durable, and impervious paving of courts and footpaths, at *one farthing*.
3. Public cleansing of the whole surface of the town, including the courts, and also watering the roads, by hose and jets of water, at *one halfpenny*.

XI. That the sewage of the borough may be extensively applied to the agricultural lands below the town, with much advantage to such lands, and so as to yield a large revenue to the public funds.

XII. That the whole of the rates for sanitary improvements would bear but a very small proportion to the amount now annually lost from excessive sickness and mortality.

XIII. That many of the cottages of the town, and also the courts, admit of no ventilation, and are otherwise constructed defectively.

XIV. That the local Acts of Parliament in force contain many provisions which it is desirable should be continued.

XV. That the Public Health Act would be highly beneficial to the borough.

WHEREUPON I RECOMMEND—

1. That the Public Health Act (1848), except the sections numbered 50 and 96 in the copies of that Act printed by Her Majesty's printers, should be applied to the borough of Newcastle-under-Lyme.

2. That all the powers given by the 56 Geo. III., c. 33. to certain trustees for the burgesses or freemen shall, as far as the same are applicable to the town-walks now vested in those trustees for the accommodation of the inhabitants, be transferred to, and vested in, the town council of the said borough as the local Board of Health.

3. That the whole of such powers as are given by the 59 Geo. III., c. 71, and are not inconsistent with the provisions of the Public Health Act, shall continue to be vested in the town council of the said borough; and that such powers as may be given by such Act, but are inconsistent with the provisions of the Public Health Act, should be repealed.

4. That the other local Acts of Parliament in force within the borough should remain unaltered.

5. That the town council should be enabled to purchase the gas-works existing in the said borough, and to maintain and alter the same.

I have the honour to be,

My Lords and Gentlemen,

Your obedient servant,

WILLIAM LEE.

The General Board of Health.

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